(a) At vehicle speeds above 20 mph, any wheel on a nonsteerable axle other than the two rearmost nonliftable, nonsteerable axles may lock up, for any duration. The wheels on the two rearmost nonliftable, nonsteerable axles may lock up according to (b).

(b) At vehicle speeds above 20 mph, one wheel on any axle or two wheels on any tandem may lock up for any duration.

(c) At vehicle speeds above 20 mph, any wheel not permitted to lock in (a) or (b) may lock up repeatedly, with each lockup occurring for a duration of one second or less.

(d) At vehicle speeds of 20 mph or less, any wheel may lock up for any duration.

Table I.—Stopping Sequence

1. Burnish.
2. Stops with vehicle at gross vehicle weight rating:
   (a) 60 mph service brake stops on a peak friction coefficient surface of 0.9, for a truck tractor with a loaded unbraked control trailer, or for a single-unit vehicle.
   (b) 30 mph service brake stops on a peak friction coefficient surface of 0.5, for a truck tractor with a loaded unbraked control trailer.
   (c) 60 mph emergency brake stops on a peak friction coefficient surface of 0.9, for a single-unit vehicle. Truck tractors are not required to be tested in the loaded condition.
3. Parking brake test with vehicle loaded to GVWR.
4. Stops with vehicle at unloaded weight plus up to 500 lbs.
   (a) 60 mph service brake stops on a peak friction coefficient surface of 0.9, for a truck tractor or for a single-unit vehicle.
   (b) 30 mph service brake stops on a peak friction coefficient surface of 0.5, for a truck tractor.
   (c) 60 mph emergency brake stops on a peak friction coefficient surface of 0.9, for a truck tractor or for a single-unit vehicle.
5. Parking brake test with vehicle at unloaded weight plus up to 500 lbs.
6. Final inspection of service brake system for condition of adjustment.

S5.3.1.1 Stop the vehicle from 60 mph on a surface with a peak friction coefficient of 0.9 with the vehicle loaded as follows: (a) loaded to its GVWR, (b) in the Bobtail configuration (truck-tractors only) plus up to 500 pounds, and (c) at its unloaded vehicle weight (except for a truck tractor) plus up to 500 pounds (including driver and instrumentation). If the speed attainable in two miles is less than 60 mph, the vehicle shall stop from a speed in Table II that is 4 to 8 mph less than the speed attainable in 2 miles.

TABLE II.—STOPPING DISTANCE

[In feet]

Vehicle speed in miles per hour	Service brake				Emergency brake	
	PFC 0.9 (1)	PFC 0.9 (2)	PFC 0.9 (3)	PFC 0.9 (4)	PFC 0.9 (5)	PFC 0.9 (6)
20	32	35	38	40	83	85
25	49	54	59	62	123	131
30	70	78	84	89	170	186
35	96	106	114	121	225	250
40	125	138	149	158	288	325
45	158	175	189	200	358	409
50	195	216	233	247	435	504
55	236	261	281	299	520	608
60	280	310	335	355	613	720

Note: (1) Loaded and unloaded buses; (2) Loaded single unit trucks; (3) Unloaded truck tractors and single unit trucks; (4) Loaded truck tractors tested with an unbraked control trailer; (5) All vehicles except truck tractors; (6) Unloaaded truck tractors.

* * * * *

S5.7.1 *Emergency brake system performance.* When stopped six times for each combination of weight and speed specified in S5.3.1.1, except for a loaded truck tractor with an unbraked control trailer, on a road surface having a PFC of 0.9, with a single failure in the service brake system of a part designed to contain compressed air or brake fluid (except failure of a common valve, manifold, brake fluid housing, or brake chamber housing), the vehicle shall stop at least once in not more than the distance specified in Column 5 of Table II, measured from the point at which movement of the service brake control begins, except that a truck-tractor tested at its unloaded vehicle weight plus up to 500 pounds shall stop at least once in not more than the distance specified in Column 6 of Table II. The stop shall be made without any part of the vehicle leaving the roadway.

* * * * *

Issued on: March 1, 1995.

Ricardo Martinez, M.D.

Administrator.

[FR Doc. 95–5413 Filed 3–7–95; 8:45 am]

BILLING CODE 4910–59–P

49 CFR Part 571

[Docket No. 93–07; Notice 3]

RIN 2127–AE21

Federal Motor Vehicle Safety Standards; Stopping Distance Requirements for Vehicles Equipped With Hydraulic Brake Systems

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation.

ACTION: Final rule.

SUMMARY: This final rule establishes stopping distance performance requirements in Standard No. 105, Hydraulic Brake Systems, for trucks,

buses, and multipurpose passenger vehicles (MPVs) that have a gross vehicle weight ratings (GVWRs) over 10,000 pounds and that are equipped with hydraulic brake systems. The requirements specify the distances in which different types of medium and heavy vehicles must come to a complete stop from a speed of 60 mph on a high coefficient of friction surface. The requirements are designed to reduce the number and severity of crashes involving these vehicles.

This notice is one part of the agency's comprehensive effort to improve the braking ability of medium and heavy vehicles. In another final rule published elsewhere in today's **Federal Register**, the agency is adopting identical stopping distance requirements for medium and heavy vehicles that are equipped with air brake systems. In a third final rule, that responds to the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, the agency is requiring medium and heavy vehicles to be equipped with an antilock brake system (ABS) to improve the lateral stability and control of these vehicles during braking.

DATES: *Effective Dates:* The amendments become effective on March 1, 1999.

Petitions for Reconsideration: Any petitions for reconsideration of this rule must be received by NHTSA no later than April 10, 1995.

ADDRESSES: Petitions for reconsideration of this rule should refer to Docket 93–07; Notice 3 and should be submitted to: Administrator, National Highway Traffic Safety Administration, 400 Seventh Street SW., Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Mr. George Soodoo, Office of Vehicle Safety Standards, National Highway Traffic Safety Administration, 400 Seventh Street SW., Washington, DC 20590 (202–366–5892).

SUPPLEMENTARY INFORMATION:

I. Background

A. Brake Related Crashes

Medium and heavy vehicles [1] are involved in thousands of motor vehicle crashes each year. One of the most important factors that contributes to these crashes is brake system performance. Crashes in which braking is a contributory factor can be further subdivided into (1) crashes due to brake failures or defective brakes, (2) runaways on downgrades, due to maladjusted or overheated brakes, (3) crashes in which vehicles are unable to stop in time, and (4) loss-of-control crashes due primarily to locked wheels during braking.

This final rule amending Standard No. 105, Hydraulic Brake Systems, to establish stopping distance requirements for hydraulically braked vehicles,[2] and the companion final rule amending Standard No. 121, Air Brake Systems (49 CFR 571.121), to reinstate stopping distance requirements for air braked heavy vehicles, will reduce the severity of or prevent crashes attributable to a vehicle's inability to stop in time.[3] In these crashes, the heavy vehicle's brakes function, but do not stop the vehicle quickly enough to avoid a crash. One way to reduce the severity or number of such crashes is to improve heavy vehicle stopping performance by reducing the distance needed to stop a vehicle. Even if crashes of this type were not totally prevented, improvements in stopping distance performance reduce collision impact speeds, and thus reduce crash severity.

The following estimates regarding heavy vehicle crashes are from NHTSA's 1992 General Estimates System (GES) which is based on data transcribed from a nationally representative sample of state police accident reports (PARs) and the Fatal Accident Reporting System (FARS). NHTSA estimates that in 1992 there were about 168,000 crashes involving heavy combination vehicles (excluding truck tractors when operating bobtail, i.e., without a trailer). These crashes resulted in about 13,600 injuries and 387 fatalities to truck occupants and about 51,500 injuries and 2452 fatalities to occupants of other involved vehicles. For bobtail truck tractors alone, the agency estimates that there were about 8,400 crashes resulting in about 1,200 injuries and 39 fatalities to truck occupants and about 2,600 injuries and 178 fatalities to occupants of other involved vehicles. For heavy single-unit trucks, the agency estimates that there were about 192,600 crashes resulting in about 15,700 injuries and 165 fatalities to truck occupants and about 48,300 injuries and 891 fatalities to occupants of other involved vehicles. In addition, crashes involving heavy vehicles result in more expensive and severe property damage than crashes involving light vehicles.

It is very difficult to quantify the number of crashes in which a vehicle's brakes are unable to stop the vehicle in time. NHTSA estimates that in 1992 there were about 18,000 crashes involving heavy combination vehicles (excluding bobtail truck tractors). These crashes resulted in about 1,800 injuries and 57 fatalities to truck occupants and about 8,400 injuries and 754 fatalities to occupants of other involved vehicles. For bobtail truck tractors alone, the agency estimates that there were about 260 crashes resulting in about 100 injuries and 7 fatalities to truck occupants and about 240 injuries and 48 fatalities to occupants of other involved vehicles. For heavy single-unit trucks, the agency estimates that there were about 30,100 crashes resulting in about 4,200 injuries and 17 fatalities to truck occupants and about 15,000 injuries and 276 fatalities to occupants of other involved vehicles. The Final Regulatory Evaluation (FRE) provides greater detail about how today's final rules will reduce injuries and fatalities resulting from such crashes.

The agency emphasizes that not all inability-to-stop-in-time crashes are preventable. Nevertheless, improvements to heavy vehicle brake systems should prevent or reduce the severity of a significant number of these crashes.

B. Brake Designs and Equipment

In order to understand the discussion of braking in this preamble, it is necessary to be familiar with several devices employed in braking systems. As explained in greater detail in the companion final rules about stopping distances for air-braked vehicles and about lateral control and stability, manufacturers have developed several devices related to the braking of hydraulically-braked heavy vehicles,

[1] Hereafter, these vehicles which have a gross vehicle weight rating (GVWR) of 10,000 pounds or more are referred to as heavy vehicles.

[2] Hydraulic brake systems are used on most single unit vehicles with gross vehicle weight ratings (GVWRs) of 26,000 pounds or less and on many medium and heavy trucks and buses with GVWRs between 26,000 pounds and 33,000 pounds. Hydraulic brakes are available on single unit vehicles with GVWRs up to 46,000 pounds, but are used to a lesser degree with such vehicles. Heavy vehicles not equipped with hydraulic brakes are equipped with air brake systems.

[3] Today's companion final rule to require heavy vehicles to be equipped with antilock brake systems (ABS) will prevent braking-induced loss-of-control crashes.

including load proportioning valves (LPVs) and antilock brake systems (ABS). LPVs change the brake proportioning to the drive axle after mechanically sensing the vehicle's load, and ABSs automatically control the amount of braking pressure applied to a wheel so as to prevent wheel lockup, thus increasing stability and control in emergency stops. As explained in the companion notices, these devices can also reduce stopping distances.

II. NHTSA Activities

A. Regulatory History

As initially promulgated, Standard No. 105, Hydraulic Brake Systems (49 CFR 571.105), set performance requirements for motor vehicles with hydraulic service brakes. (37 FR 17970, September 2, 1972.) The 1972 rule required, among other things, that heavy vehicles stop from 60 mph within 245 feet when in the lightly loaded condition and within 553 feet under partial failure conditions. Some petitions for reconsideration challenged the setting of stopping distance requirements for hydraulically-braked vehicles that were more stringent than those set for air-braked vehicles in Standard No. 121. While the initial stopping distance requirement of 245 feet in Standard No. 121 was identical to Standard No. 105's requirement, Standard No. 121 was later revised to require stopping within 258 feet and then 293 feet.

The requirements for air-braked vehicles were to become effective on September 1, 1973, and those for hydraulic-braked vehicles, on September 1, 1974. NHTSA extended the effective dates for the stopping distance requirements in Standard No. 105 and Standard No. 121. (37 FR 3905, February 24, 1972; 38 FR 3047, February 1, 1973; 39 FR 17550, 17563, May 17, 1974.) Prior to the final effective date for Standard No. 105, the amendments pertaining to heavy vehicles were withdrawn, so the requirements for heavy hydraulic-braked trucks and buses never went into effect. (40 FR 18411, April 28, 1975.) The agency concluded that the requirements that were being withdrawn could not be justified ''on the basis of the data available at this time.'' The agency noted that its decision to withdraw the amendment implementing requirements for vehicles other than passenger cars was based on uncertainty as to the achievable safety benefits relative to the costs of meeting those requirements, rather than on an explicit determination that the requirements were not justified. Notwithstanding this decision, the agency emphasized that ''truck braking is in many cases substantially poorer than passenger car braking, and that the generally longer stopping distances and the greater severity of truck accidents justify a safety standard for these vehicles.''

There are two primary reasons for the substantial costs that would have been involved in meeting those requirements. The first reason was the level of stringency of the requirements: the stopping distance requirement from 60 mph was 246 feet, which was the original requirement implemented for air-braked vehicles in Standard No. 121 that was later revised to 293 feet. The second reason relates to the state-of-the-art of hydraulic brake system technology in 1975 versus that of today. As discussed in detail in the Final Regulatory Evaluation (FRE), the requirements being implemented by this notice will not require any changes in the design or performance of hydraulically-braked heavy vehicles.

Since its decision in 1975 to narrow Standard No. 105's applicability, NHTSA has issued several amendments extending its applicability to certain types of vehicles. In 1976, the agency extended the Standard's applicability to all school buses. (41 FR 2391, January 16, 1976.) In 1981, it extended the standard's applicability on a general basis (with some limitations) to trucks, all types of buses, and MPVs with a GVWR of 10,000 pounds or less. (46 FR 55, January 2, 1981.) As for trucks, buses, and MPVs with a GVWR greater than 10,000 pounds, the agency extended the requirements for braking with partial hydraulic system failures and power booster unit failures. However, the service and parking brake performance requirements, including those for stopping distances, have not been re-adopted for hydraulically-braked trucks and non-school buses with GVWRs over 10,000 pounds. The reader should refer to the February 1993 NPRMs and today's companion final rules for a detailed discussion of the regulatory history.

These requirements have received a great deal of agency and judicial attention. (58 FR 11009, February 23, 1993.) Along with certain other provisions, the stopping distance requirements for air-braked vehicles were invalidated by the United States Court of Appeals for the 9th Circuit in *PACCAR* v. *NHTSA*, 573 F.2d 632, (9th Cir. 1978) cert. denied, 439 U.S. 862 (1978).

While PACCAR involved air-braked vehicles, it is relevant to hydraulically-braked vehicles as well. The stability and control final rule contains a detailed discussion about PACCAR and how the agency has responded to that decision. As mentioned earlier, the stopping distance requirements in this final rule are significantly longer than those that were rescinded in 1975.

However, as also discussed earlier, the same stopping distance requirements that were implemented in 1975 for air-braked vehicles were later extended to levels that are close to those included in this notice. One significant difference between the original requirements in 1975 for hydraulically braked, heavy vehicles and those contained in today's final rule is that the agency has decided to specify different stopping distances for different configurations of heavy vehicles. Today's requirements can further be distinguished from those invalidated in the 1970s, since manufacturers will not need to significantly redesign their brakes or use overly aggressive foundation brakes to comply with today's requirements.

Even though the stopping distance requirements being specified in today's final rule are less stringent for some vehicle configurations than those invalidated by PACCAR for air-braked vehicles, the agency believes that the braking requirements in today's final rules, taken as a whole, significantly enhance the overall braking performance of hydraulically-braked vehicles given the agency's decision to require these vehicles to be equipped with ABS.

B. Agency Research

As part of its review of heavy vehicle braking, NHTSA issued a report entitled ''NHTSA Heavy Duty Vehicle Brake Research Program Report No. 4—Stopping Capability of Hydraulically Braked Vehicles'' (DOT HS 806 860, October 1985). That report was based on a comprehensive testing of twelve hydraulically-braked vehicles ranging in weight from 14,800 to 46,000 pounds in both the empty and loaded conditions. The straight line stopping distance tests measured the shortest possible stop within a 12-foot-wide lane without locking up more than one wheel per axle or two wheels per tandem axle at speeds greater than 20 mph. At 60 mph, stopping distances ranged from 214 feet to 396 feet. Among other things, the agency found that the ability to stop in a short distance without loss of control is primarily a function of front/rear braking force distribution. Vehicles with brake force distributions closest to their dynamic weight distributions were the best performers.

C. Heavy Vehicle Safety Report to Congress

In response to section 9107 of the Truck and Bus Regulatory Reform Act of 1988, the agency submitted a report to Congress entitled ''Improved Brake Systems for Commercial Vehicles.'' (DOT HS 807 706, April 1991)[4] While the report focuses on air brakes systems, much of the information is relevant to hydraulically-braked heavy vehicles. After discussing crash data concerning heavy vehicle brake systems, the report explained factors related to braking effectiveness and stability and control during braking. The report mentioned that stopping distances and vehicle stability could be improved by equipping heavy vehicles with LPVs and ABS.

III. Agency Proposal

On February 23, 1993, NHTSA proposed to amend Standard No. 105 to establish different stopping distance requirements for different types of heavy vehicles equipped with hydraulic brake systems, when making stops from 60 mph on a high coefficient of friction surface. (58 FR 11003.) The agency tentatively concluded that establishing the same stopping distance requirement for all heavy vehicles with fully operational service brakes would be inappropriate, since it would be too stringent for unloaded single unit trucks but not stringent enough for buses. The proposed stopping distances were based on the agency's analysis of the available data, especially the stopping distance results in the VRTC reports.

NHTSA explained that its long-term objective is to upgrade the braking efficiency of heavy vehicles to enable them to make controlled, stable stops, under all loading and road surface conditions. The agency believed that the proposed requirements would reduce the disparity in stopping distance performance between heavy vehicles and passenger cars, while assuring that the requirements' costs are reasonable. The agency proposed stopping distance requirements for vehicles equipped with hydraulic brake systems consistent with the stopping distance requirements for air-braked heavy vehicles. These requirements would take effect two years after issuance of the final rule. The agency decided not to propose the first effectiveness test, which involves the preburnish condition. However, it proposed the second effectiveness test, where the vehicle is tested at its GVWR to assure full braking power, and the third effectiveness test where the vehicle is tested in the lightly loaded vehicle condition to assure reasonable brake balance.

IV. Comments on the Proposal

NHTSA received 29 comments in response to the NPRM. Commenters included heavy vehicle manufacturers, brake manufacturers, safety advocacy groups, heavy vehicle users, industry trade associations, and other individuals. The American Automobile Manufacturers Association (AAMA) submitted joint comments on behalf of the eight major domestic manufacturers of heavy vehicles: Chrysler, Ford, Freightliner, General Motors (GM), Mack Trucks, Navistar, PACCAR, and Volvo-GM.

The commenters generally supported the agency's decision to establish stopping distance requirements. However, they offered mixed views about the specific stopping distances being proposed. GM, Navistar, Heavy Duty Brake Manufacturers Council (HDBMC), and Rockwell WABCO stated that the proposed stopping distance requirements are appropriate. In contrast, the Insurance Institute for Highway Safety (IIHS), the Coalition for Consumer Health, and Advocates for Highway Safety (Advocates) believed that the required distances for trucks and buses should be shorter. Advocates stated that the proposal did little more than ''grandfather'' existing braking capabilities and therefore would not result in the best available braking performance for large trucks.

Commenters also addressed specific issues raised in the NPRM, including the requirements' applicability to school buses, the need for the first and fourth effectiveness tests, the vehicle test speed, the test surface specification, the wheel lock up restrictions, the initial brake temperature, the failed system test, the vehicle loading, the parking brake test, the burnish procedures, and the implementation schedule for the requirements. More specific discussions of these comments, and the agency's responses to them, are set forth either below or in the stopping distance rule for Standard No. 121.[5]

V. Agency Decision

A. Overview

Based on the FARS and other crash data, test data from the agency's heavy vehicle brake research program, comments to the NPRM, and other available information, NHTSA has decided to amend Standard No. 105 to establish stopping distance performance requirements for heavy vehicles that are equipped with hydraulic brake systems. The requirements, which apply to 60 mph stops on a high coefficient of friction surface, specify different stopping distance requirements for three different types of heavy vehicle configurations: (1) loaded and unloaded buses, (2) loaded single unit trucks, and (3) empty single unit trucks. The requirements are designed to standardize the distance needed for all heavy vehicles to come to a complete stop, thereby reducing the number and severity of crashes.

This notice is one part of the agency's comprehensive effort to improve the braking ability of heavy vehicles. In another final rule published elsewhere in today's **Federal Register**, the agency is adopting identical stopping distance requirements for comparable heavy vehicles that are equipped with air brake systems. The agency believes that it is appropriate to specify the same stopping distance requirements for similar vehicles. In a third final rule, the agency is responding to the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 by requiring heavy vehicles to be equipped with an antilock brake system to improve the lateral stability and control of these vehicles during braking.

B. Stopping Distance Requirements

Based on its testing at VRTC, NHTSA proposed different stopping distances for various categories of vehicles, as follows:

Loaded and Unloaded Buses.....280 ft.
Loaded Single-Unit Trucks .....310 ft.
Empty Single-Unit Trucks.....335 ft.

The agency reasoned that a single stopping distance requirement for all heavy vehicles with fully operational service brakes would be too stringent for unloaded single unit trucks, but not be stringent enough for buses. Based on the VRTC test results, the agency anticipated that manufacturers would not have to make changes to the hydraulic braking systems of their vehicles to comply with the proposed stopping distance requirements.

AAMA and most other industry commenters agreed with the stopping distance values proposed for the various vehicle configurations. GM, Navistar,

[4] The report may be examined at the agency's Technical Reference Office, room 5108, at no charge. It is available from the National Technical Information Service (NTIS), Springfield, VA 22161 for a small charge.

[5] The stopping distance rule for air-braked vehicles discusses the issues of the test surface, wheel lock restrictions, initial brake temperature, the failed system test, vehicle loading, the parking brake test, and burnish procedures.

Heavy Duty Brake Manufacturers Council (HDBMC), and Rockwell WABCO commented that they believed that the proposed stopping distance requirements are appropriate. ATA agreed with the proposal to specify different stopping distances for different types and loadings of vehicles. It also agreed with specifying the same stopping distances for the same types of air-braked and hydraulically-braked vehicles under the same loading conditions.

In contrast, other commenters stated that the proposed stopping distances were not sufficiently stringent. Advocates stated that the proposed stopping distances simply ratify braking distances currently achieved by manufacturers and do not seek to improve real-world braking performance. It stated that except for the 280-foot requirement for buses, the other proposed stopping distances are longer than the 293 feet established before PACCAR. Similarly, IIHS stated that the proposals do not go far enough toward requiring the best available braking for heavy vehicles.

Based on the public comments and other available information, especially the VRTC test results, NHTSA has decided to specify different stopping distances for three separate categories of vehicles, when tested at a speed of 60 mph on a surface with a PFC of 0.9, as follows:

Loaded and Unloaded Buses.....280 ft.
Loaded Single-Unit Trucks .....310 ft.
Unloaded Single-Unit Trucks .....335 ft.

NHTSA believes that these stopping distances, combined with the stability and control final rule, will ensure that heavy vehicles make short stable stops within a reasonable distance. The agency further notes that the companion notice to require heavy vehicles to be equipped with antilock brake systems will also help to improve the braking performance of those vehicles enough to enable them to comply with the stopping distance requirements.

C. First Effectiveness Test

The first effectiveness test in Standard No. 105, which is commonly known as the ''preburnish test,'' measures brake performance very early in a vehicle's life. School buses are the only heavy vehicle type currently subject to the first effectiveness test (and to Standard No. 105's other stopping distance requirements.)

In the NPRM, NHTSA did not propose applying the preburnish test to other heavy vehicles. The agency stated that the first effectiveness test would continue to apply to school buses, since it did not want to modify the Standard's current requirements. The agency reasoned that subjecting school buses (but not other heavy vehicles) to the first effectiveness test was appropriate given the provisions in the vehicle safety law pertaining to school buses (codified as 49 U.S.C. 301), and the ''stop-and-go'' duty cycle of school buses. The agency requested comment on whether to apply the first effectiveness test to heavy vehicles in general and whether to retain the test for school buses.

AAMA, AlliedSignal, and HDBMC stated that heavy vehicles, including school buses, should not be subject to the first effectiveness test and the 30-mph second effectiveness test. AlliedSignal commented that excluding hydraulically braked school buses from the first effectiveness test would be consistent with the agency's intent for consistency between hydraulically braked and air-braked vehicles. AlliedSignal also stated that the intended usage of non-school buses and school buses is nearly identical, and that chassis components are nearly identical. AAMA commented that school buses and non-school buses should have standardized braking requirements. AAMA disagreed with the agency's statement that the school bus provisions of the law have a bearing on the need for a first effectiveness or 30-mph second effectiveness requirements for school buses. Straight-Stop and Arent Fox recommended that transit buses and school buses be tested at speeds typical of their normal use such as 20 to 30 mph. Chrysler agreed with the agency's proposal not to apply the first effectiveness test to heavy vehicles, except for school buses.

Advocates requested that the agency apply the first effectiveness test to all hydraulic braked vehicles, not just school buses. It claimed that the new non-asbestos linings tend to swell early in the service lives of new brakes. As a result, it believed that the stopping distance would be degraded during this period, a phenomenon that would be detrimental to safety. Advocates argued that the agency cannot arbitrarily dismiss the first effectiveness test with an assertion that it is not aware of any ''green brake'' crashes.

After reviewing the comments and other available information, NHTSA has decided not to apply the preburnish test to all heavy vehicles equipped with hydraulic brakes. It has also decided that the test should not apply to school buses. As explained in the NPRM, NHTSA is not aware of any crashes involving hydraulically braked heavy vehicles caused by ''green'' brake linings. Therefore, the agency has determined that there is no need to apply the preburnish test to heavy vehicles. The agency notes that its decision not to apply the preburnish test to heavy vehicles results in the requirements in Standard No. 105 and Standard No. 121 being consistent for similar vehicles given the absence of a preburnish test in FMVSS No. 121 for air-braked school buses.[6]

With respect to non-asbestos linings, NHTSA agrees that there is a tendency for such linings to swell early in the life of the new brakes. However, the agency has already addressed this issue in greater detail in a NPRM on the brake adjustment procedure for brake burnish of heavy vehicles (56 FR 66395, December 23, 1991). The agency concluded that the swelling of the non-asbestos linings has no effect on their service life or on the service brake performance of the vehicle.

D. Second Effectiveness Test

The second effectiveness test in Standard No. 105 assesses brake performance when a vehicle is in its fully loaded condition. In the NPRM, NHTSA proposed extending the second effectiveness test to hydraulically-braked heavy vehicles. The agency explained that this test replicates one of the most common loading conditions for heavy vehicles. The agency tentatively concluded that it would be in the interests of safety to establish stopping distance requirements for hydraulically-braked heavy vehicles in the fully loaded condition (at GVWR).

NHTSA notes that, unlike the requirements in Standard No. 121 which specify 60-mph stops, the second effectiveness test includes 30-mph stops as well as 60-mph stops. The agency proposed applying the 30-mph test to school buses, since it is similar to their in-service stop-and-go operation. Although there is no similar 30-mph road test for air-braked school buses, the brake assemblies of these vehicles are required to be tested on a dynamometer under section S5.4 of Standard No. 121. These tests evaluate the capability of a brake assembly in a stop-and-go duty cycle. Section S5.4.2, Brake Power, requires that the brake be capable of making 10 consecutive decelerations from 50 mph to 15 mph at an average deceleration rate of 9 feet per second. Therefore, the agency further believed that the 30-mph portion of the second effectiveness tests should be retained for school buses only, given their stop-and-go duty cycle.

[6] The agency decided not to include a preburnish test in Standard No. 135, reasoning that few vehicles are driven any length of time in an unburnished condition.

AlliedSignal was the sole commenter on the issue of the 30-mph stopping distances. It stated that its testing of a current system showed that the proposed requirement of 70 feet for the 30-mph second effectiveness test would be difficult to meet without major brake redesign. It therefore recommended that the requirement be increased to at least 78 feet if the agency decides not to exclude school buses from this test.

NHTSA has decided to apply the test requirement to school buses with a stopping distance of 70 feet, as proposed. The agency notes that no vehicle manufacturer objected to the proposed stopping distance value. Further, NHTSA's test data (NHTSA Heavy-Duty Vehicle Brake Research Program Report No. 4—Stopping Capability of Hydraulically-Braked Vehicles) show that 70 feet is a reasonable requirement from 30 mph for the second effectiveness test.

NHTSA acknowledges that some transit buses have stop-and-go duty cycles similar to school buses. However, such vehicles are typically equipped with air brake systems, and would therefore be required to have their brake assemblies dynamometer tested. The 30-mph second effectiveness test would not apply to these vehicles because they are not school buses.

E. Leadtime

In the NPRM, NHTSA proposed that the stopping distance requirements become effective two years after the final rule's publication.

AAMA supported the proposed effective date, provided that the agency incorporated its recommended modifications in the final rule. Rockwell recommended that the stopping distance requirements and the stability performance requirements be combined so that the effective dates for both rulemakings are concurrent. Several commenters to the stability and control NPRM, including AAMA, made the same suggestion. AAMA noted that since ABS can have a direct influence on achievable stopping distance, it is important to optimize brake system performance by taking both stopping distance and stability into account.

On April 12, 1994, NHTSA published a supplemental notice of proposed rulemaking (59 FR 17326) that proposed the following implementation schedule for both the stopping distance and lateral stability and control requirements:

Truck tractors ....2 years after final rule (1996)
Trailers.....3 years after final rule (1997)
Air-braked single unit trucks and buses .....3 years after final rule (1997)
Hydraulic-braked single unit trucks and buses....4 years after final rule (1998).

The agency reasoned that making the effective dates for the two rulemakings concurrent would facilitate a more orderly implementation process, avoid the need for manufacturers to redesign the brakes on individual vehicles twice, and reduce the development and compliance costs that manufacturers would face as a result of these regulations. NHTSA requested comments about the implementation schedule proposed in the supplemental notice.

As the stability and control final rule discusses in detail in the section titled ''Implementation Schedule,'' NHTSA has decided to adopt an implementation schedule similar to the one proposed in the SNPRM. Specifically, hydraulically-braked heavy vehicles manufactured on or after March 1, 1999 will have to be equipped with ABS and comply with the high coefficient of friction stopping distance requirements. The agency has decided that these effective dates, which were widely supported by vehicle manufacturers, brake manufacturers, and safety advocacy groups, will provide for an efficient implementation of the heavy vehicle braking requirements.

F. Costs

As indicated earlier, NHTSA does not anticipate the need for vehicle manufacturers to change the design of the foundation brake system of heavy, hydraulically braked vehicles in order to comply with the requirements of this final rule. The only costs associated with this rulemaking are those related to compliance testing costs. As detailed in the FRE, the agency estimates these costs to be $1.030 million, or an average per-vehicle cost of $5.30.

Rulemaking Analyses and Notices

Executive Order 12866 and DOT Regulatory Policies and Procedures

This rulemaking document was not reviewed under E.O. 12866. NHTSA has considered the impact of this rulemaking action under the Department of Transportation's regulatory policies and procedures. This action has been determined to be not ''significant'' under those policies and procedures.

A FRE setting forth the agency's detailed analysis of the benefits and costs of this rulemaking (along with the other rules issued today) has been prepared and been placed in the docket. As mentioned above, the agency estimates that the costs attributable to these requirements are approximately $1.03 million for testing costs.

Based on its analysis, the agency concludes that the requirements will improve safety by ensuring that all heavy vehicles are capable of stopping within a safe distance. The agency believes that implementing the stopping distance requirements for heavy vehicles will not result in significant costs since the braking performance of currently produced vehicles is adequate for these vehicles to comply with the reinstated requirements.

B. Regulatory Flexibility Act

NHTSA has also considered the impacts of this notice under the Regulatory Flexibility Act. I hereby certify that this proposed rule will not have a significant economic impact on a substantial number of small entities. As mentioned above, most heavy vehicles will comply with the requirements without the need for significant changes. In addition, the agency is not aware of any manufacturer of heavy vehicles or hydraulic brake systems that is considered to be a small entity. There are no added costs associated with modifying a vehicle's brake system to comply with the requirements implemented by this final rule. The industry test cost per vehicle to assure compliance with the proposal is very small: $5.30. Accordingly, no regulatory flexibility analysis has been prepared.

C. Paperwork Reduction Act

In accordance with the Paperwork Reduction Act of 1980 (P.L. 96–511), there are no requirements for information collection associated with this proposed rule.

D. National Environmental Policy Act

NHTSA has also analyzed this rule under the National Environmental Policy Act and determined that it will not have a significant impact on the human environment. No changes in existing production or disposal processes will result, except that there is a reduction resulting from the removal of the ALV. Nor should production and disposal processes have a significant adverse affect on the environment.

E. Executive Order 12612 (Federalism)

NHTSA has analyzed this rule in accordance with the principles and criteria contained in E.O. 12612, and has determined that this rule will not have significant federalism implications to warrant the preparation of a Federalism Assessment.

F. Civil Justice Reform

This final rule does not have any retroactive effect. Under 49 U.S.C. 30103, whenever a Federal motor vehicle safety standard is in effect, a State may not adopt or maintain a safety standard applicable to the same aspect of performance which is not identical to the Federal standard, except to the extent that the State requirement imposes a higher level of performance and applies only to vehicles procured for the State's use. 49 U.S.C. 30161 sets forth a procedure for judicial review of final rules establishing, amending or revoking Federal motor vehicle safety standards. That section does not require submission of a petition for reconsideration or other administrative proceedings before parties may file suit in court.

List of Subjects in 49 CFR Part 571

Imports, Motor vehicle safety, Motor vehicles, Rubber and rubber products, Tires.

In consideration of the foregoing, the agency is amending Standard No. 105, Hydraulic Brake Systems, in Title 49 of the Code of Federal Regulations at Part 571 as follows:

PART 571—[AMENDED]

1. The authority citation for Part 571 continues to read as follows:

Authority: 49 U.S.C. 322, 30111, 30115, 30117, and 30166, delegation of authority at 49 CFR 1.50.

§ 571.105 [Amended]

2. Section 571.105 is amended by adding the definition of ''wheel lockup'' in S4 and by revising Table II, S5.1.1, S5.1.1.2, S6, S6.9, and S6.10; and by adding S6.9.1, S6.9.2, S6.10.1 and S6.10.2 to read as follows:

* * * * *

Wheel lockup means 100 percent wheel slip.

* * * * *

TABLE II.—STOPPING DISTANCES

Vehicle test speed (miles per hour)	Stopping distance in feet for tests indicated															
	I—1st (preburnished) & 4th effectiveness; spike effectiveness check				II—2d effectiveness				III—3d (lightly loaded vehicles) effectiveness					IV—Inoperative brake power and power assist unit; partial failure		
	(a)	(b)	(c)	(d)	(a)	(b) & (c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)	(a)	(b) & (c)	(d) & (e)
30	[1] 57	[1,2] 65	[1,2] 69 (1st) [1,2] 65 and spike)	(4th												
			[1] 72	[1,2] 88	[1] 54	[1] 57	[1,2] 78	70	51	57	65	84	70	114	130	170
35	74	83	91	132	70	74	106	96	67	74	83	114	96	155	176	225
40	96	108	119	173	91	96	138	124	87	96	108	149	124	202	229	288
45	121	137	150	218	115	121	175	158	110	121	137	189	158	257	291	358
50	150	169	185	264	142	150	216	195	135	150	169	233	195	317	359	435
55	181	204	224	326	172	181	261	236	163	181	204	281	236	383	433	530
60	[1] 216	[1] 242	[1] 267	[1,2] 388	[1] 204	[1] 216	[1] 310	280	[1] 194	[1] 216	[1] 242	[1] 335	280	[1] 456	[1] 517	[1] 613
80	[1] 405	[1] 459	[1] 510	NA	[1] 383	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
95	[1] 607	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
100	[1] 673	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[1] Distance for specified tests. [2] Applicable to school buses only. NA=Not applicable.

NOTE: (a) Passenger cars; (b) vehicles other than passenger cars with GVWR of less than 8,000 lbs; (c) vehicles with GVWR of not less than 8,000 lbs and not more than 10,000 lbs; (d) vehicles with GVWR greater than 10,000 lbs; (e) buses, including school buses, with GVWR greater than 10,000 lbs.

* * * * *

S5.1.1 *Stopping distance.*

(a) The service brakes shall be capable of stopping each vehicle with a GVWR of less than 8,000 pounds, and each school bus with a GVWR between 8,000 pounds and 10,000 pounds in four effectiveness tests within the distances and from the speeds specified in S5.1.1.1, S5.1.1.2, S5.1.1.3, and S5.1.1.4.

(b) The service brakes shall be capable of stopping each vehicle with a GVWR of between 8,000 pounds and 10,000 pounds, other than a school bus, in three effectiveness tests within the distances and from the speeds specified in S5.1.1.1, S5.1.1.2, and S5.1.1.4.

(c) The service brakes shall be capable of stopping each vehicle with a GVWR greater than 10,000 pounds in two effectiveness tests within the distances and from the speeds specified in S5.1.1.2 and S5.1.1.3.

* * * * *

S5.1.1.2 In the second effectiveness test, each vehicle with a GVWR of 10,000 pounds or less and each school bus with a GVWR greater than 10,000 pounds shall be capable of stopping from 30 mph and 60 mph, and each vehicle with a GVWR greater than 10,000 pounds (other than a school bus) shall be capable of stopping from 60 mph, within the corresponding distances specified in Column II of Table II. If the speed attainable in 2 miles is not less than 84 mph, a passenger car or other vehicle with a GVWR of 10,000 pounds or less shall also be capable of stopping from 80 mph within the corresponding distances specified in Column II of Table II.

* * * * *

S6 *Test conditions.* The performance requirements of S5 shall be met under the following conditions. Where a range of conditions is specified, the vehicle shall be capable of meeting the requirements at all points within the range. Compliance of vehicles manufactured in two or more stages may, at the option of the final-stage manufacturer, be demonstrated to comply with this standard by adherence to the instructions of the incomplete manufacturer provided with the vehicle in accordance with § 568.4(a)(7)(ii) and § 568.5 of title 49 of the Code of Federal Regulations.

* * * * *

S6.9 *Road Surface.*

S6.9.1 For vehicles with a GVWR of 10,000 pounds or less, road tests are conducted on a 12-foot-wide, level roadway, having a skid number of 81. Burnish stops are conducted on any surface. The parking brake test surface is clean, dry, smooth, Portland cement concrete.

S6.9.2 For vehicles with a GVWR greater than 10,000 pounds, road tests are conducted on a 12-foot-wide, level roadway, having a peak friction coefficient of 0.9 when measured using an American Society for Testing and Materials (ASTM) E 1136 standard reference test tire, in accordance with ASTM Method E 1337–90, at a speed of 40 mph, without water delivery. Burnish stops are conducted on any surface. The parking brake test surface is clean, dry, smooth, Portland cement concrete.

* * * * *

S6.10 *Vehicle Position and Wheel Lockup Restrictions.* The vehicle is aligned in the center of the roadway at the start of each brake application. Stops, other than spike stops, are made without any part of the vehicle leaving the roadway.

S6.10.1 For vehicles with a GVWR of 10,000 pounds or less, stops are made with wheel lockup permitted only as follows:

(a) At vehicle speeds above 10 mph, there may be controlled wheel lockup on an antilock-equipped axle, and lockup of not more than one wheel per vehicle, uncontrolled by an antilock system. (Dual wheels on one side of an axle are considered a single wheel.)

(b) At vehicle speeds of 10 mph or less, any wheel may lock up for any duration.

(c) Unlimited wheel lockup is allowed during spike stops (but not spike check stops), partial failure stops, and inoperative brake power or power assist unit stops.

S6.10.2 For vehicles with a GVWR greater than 10,000 pounds, stops are made with wheel lockup permitted only as follows:

(a) At vehicle speeds above 20 mph, any wheel on a nonsteerable axle other than the two rearmost nonliftable, nonsteerable axles may lock up for any duration. The wheels on the two rearmost nonliftable, nonsteerable axles may lock up according to (b).

(b) At vehicle speeds above 20 mph, one wheel on any axle or two wheels on any tandem may lock up for any duration.

(c) At vehicle speeds above 20 mph, any wheel not permitted to lock in (a) or (b) may lock up repeatedly, with each lockup occurring for a duration of one second or less.

(d) At vehicle speeds of 20 mph or less, any wheel may lock up for any duration.

(e) Unlimited wheel lockup is allowed during partial failure stops, and inoperative brake power or power assist stops.

Issued on March 1, 1995.

Ricardo Martinez,

Administrator.

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